

WHAT IS CLAIMED IS:

1. An intravascular flow modifier and reinforcement device for use in the intravascular treatment of a target site in a blood vessel, comprising:
a generally cylindrical frame formed of an elongate resilient wire configured as a series of helical windings, said generally cylindrical frame having a deployed configuration and a predeployed compressed configuration for placement of the intravascular flow modifier and reinforcement device at the target site, said generally cylindrical frame in its deployed configuration having a helical pattern of sharp alternating zigzag bends.
2. The intravascular flow modifier and reinforcement device of Claim 1, wherein said predeployed compressed configuration comprises a substantially flattened configuration.
3. The intravascular flow modifier and reinforcement device of Claim 1, wherein said deployed configuration comprises a generally cylindrical configuration.
4. The intravascular flow modifier and reinforcement device of Claim 1, wherein said generally cylindrical frame has a cross-section formed in the shape of a polygon or modified polygon having at least one straight portion.
5. The intravascular flow modifier and reinforcement device of Claim 1, wherein said deployed configuration varies in cross-sectional area along its longitudinal axis.
6. The intravascular flow modifier and reinforcement device of Claim 1, wherein said windings of said generally cylindrical frame vary in pitch along the longitudinal axis of said generally cylindrical frame.

7. The intravascular flow modifier and reinforcement device of Claim 1, wherein said predeployed compressed configuration comprises a radially compressed configuration.

8. The intravascular flow modifier and reinforcement device of Claim 1, wherein said helical windings have a range of pitch to provide a wire coverage of the inner surface area of the target site being treated of between about 7% and about 40%.

9. The intravascular flow modifier and reinforcement device of Claim 1, wherein said alternating zigzag bends have an angle that is less than about 120° to promote laminar arterial flow.

10. The intravascular flow modifier and reinforcement device of Claim 1, wherein said helical windings have a variable pitch.

11. The intravascular flow modifier and reinforcement device of Claim 1, wherein said helical windings have a variable diameter over the length of the intravascular flow modifier and reinforcement device.

12. The intravascular flow modifier and reinforcement device of Claim 1, wherein each of said helical windings comprise a series of between 4 and 8 alternating zigzag bends in a rotation of the wire.

13. The intravascular flow modifier and reinforcement device of Claim 1, wherein each of said helical windings comprise a series of 4 alternating zigzag bends in a rotation of the wire.

14. The intravascular flow modifier and reinforcement device of Claim 1, wherein each of said helical windings comprise a series of 6 alternating zigzag bends in a rotation of the wire.

15. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is formed of a superelastic material.

16. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is formed of a shape memory material.

17. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is formed of a nickel-titanium alloy.

18. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is coated with a corrosion resistant material.

19. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is coated with Parylene.

20. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is treated by chemical electropolishing to maximize corrosion resistance.

21. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire comprises a stranded cable including one or more radiopaque strands.

22. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire comprises a stranded cable having radiopaque markers deployed along the said stranded cable.

23. The intravascular flow modifier and reinforcement device of Claim 22, wherein said stranded cable is made of a material selected from the group consisting of stainless steel, shape-memory alloy, superelastic alloy, platinum and combinations thereof.

24. The intravascular flow modifier and reinforcement device of Claim 1, wherein said elongate resilient wire is formed by laser cutting a piece of tubing.

25. A system for deploying an intravascular flow modifier and reinforcement device for use in the intravascular treatment of a target site in a patient's vasculature, the intravascular flow modifier and reinforcement device including a generally cylindrical frame formed of an elongate resilient wire configured as a series of helical windings, the system comprising:

a substantially tubular pusher catheter member having an inner lumen, a proximal portion, a distal portion, a tubular main shaft, and a notched portion having at least one notch formed in a side of the pusher catheter member for receiving at least one said helical winding; and

means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member, said means for removably retaining being capable of being withdrawn from said notched portion of said pusher catheter member when the intravascular flow modifier and reinforcement device is positioned at the site in the patient's vasculature to be treated to release and deploy the intravascular flow modifier and reinforcement device at the site in the patient's vasculature to be treated.

26. The system of Claim 25, wherein said notched portion comprises a plurality of alternating notches and tubular shoulder portions formed in said substantially tubular pusher catheter member.

27. The system of Claim 25, wherein said means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member comprises a release wire threaded through the lumen of the pusher catheter member and over said at least one helical winding to retain said at least one helical winding on said notched portion of said pusher catheter member.

28. The system of Claim 26, wherein a plurality of said helical windings of the intravascular flow modifier and reinforcement device are received in each of said notches.

29. The system of Claim 27, further comprising a delivery catheter, and wherein said substantially tubular pusher catheter member and the intravascular flow modifier and reinforcement device received on said notched portion of said pusher catheter member are disposed in the delivery catheter, and wherein said delivery catheter can be withdrawn along with said release wire from said notched portion of said pusher catheter member when the intravascular flow modifier and reinforcement device is positioned at the site in the patient's vasculature to be treated for delivery of the intravascular flow modifier and reinforcement device to the site in the patient's vasculature to be treated.

30. The system of Claim 25, wherein said notched portion comprises a first plurality of notches on one side of the shaft, and a second plurality of notches on an opposing side of the shaft.

31. The system of Claim 30, wherein said means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member comprises a delivery catheter, and wherein said substantially tubular pusher catheter member and the intravascular flow modifier and reinforcement device received on said notched portion of said pusher catheter member are disposed in the delivery catheter, and wherein said delivery catheter can be

withdrawn from said notched portion of said pusher catheter member when the intravascular flow modifier and reinforcement device is positioned at the site in the patient's vasculature to be treated for delivery of the intravascular flow modifier and reinforcement device to the site in the patient's vasculature to be treated.

32. The system of Claim 30, wherein individual ones of said notches of said second plurality of notches are offset from corresponding ones of said first plurality of notches.

33. The system of Claim 31, wherein said delivery catheter has an inner diameter that is only slightly larger than an outer diameter of the pusher catheter member, so as to retain the intravascular flow modifier and reinforcement device on the pusher catheter member.

34. A method for deploying an intravascular flow modifier and reinforcement device for use in the intravascular treatment of a target site in a patient's vasculature, the intravascular flow modifier and reinforcement device including a generally cylindrical frame formed of an elongate resilient wire configured as a series of helical windings, the steps of the method comprising:

releasably mounting at least one helical winding of the intravascular flow modifier and reinforcement device on notched portion of a substantially tubular pusher catheter member, said notched portion having at least one notch formed in a side of the pusher catheter member for receiving said at least one helical winding;

disposing a means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member over said at least one helical winding;

positioning said means for removably retaining the intravascular flow modifier and reinforcement device at the site in the patient's vasculature to be treated; and

withdrawing said means for removably retaining from said notched portion of said pusher catheter member to release and deploy the intravascular flow modifier and reinforcement device at the site in the patient's vasculature to be treated.

35. The method of Claim 34, wherein said means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member comprises a release wire threaded through the pusher catheter member and over said at least one helical winding to retain said at least one helical winding on said notched portion of said pusher catheter member, and said step of withdrawing said means for removably retaining from said notched portion of said pusher catheter member comprises withdrawing said release wire from said notched portion.

36. The method of Claim 34, wherein said means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member comprises a delivery catheter having an inner diameter that is only slightly larger than an outer diameter of the pusher catheter member, so as to retain the intravascular flow modifier and reinforcement device on the pusher catheter member, said notched portion and said at least one helical winding of the intravascular flow modifier and reinforcement device being disposed in said delivery catheter, and said step of withdrawing said means for removably retaining from said notched portion of said pusher catheter member comprises withdrawing said delivery catheter from said notched portion.

37. A system for deploying an intravascular flow modifier and reinforcement device for use in the intravascular treatment of a target site in a patient's vasculature, the intravascular flow modifier and reinforcement device including a generally cylindrical frame formed of an elongate resilient wire configured as a series of helical windings, the system comprising:

a substantially tubular pusher catheter member having an inner lumen, a proximal portion, a distal portion, a tubular main shaft, and a notched portion having at least one notch formed in a side of the pusher catheter member for receiving at least one said helical winding, said substantially tubular pusher catheter member being formed of a nickel-titanium alloy; and

means for removably retaining said at least one helical winding on said notched portion of said pusher catheter member, said means for removably retaining being capable of being withdrawn from said notched portion of said pusher catheter member when the intravascular flow modifier and reinforcement device is positioned at the site in the patient's vasculature to be treated to release and deploy the intravascular flow modifier and reinforcement device at the site in the patient's vasculature to be treated.

38. A system for deploying an intravascular flow modifier and reinforcement device for use in the intravascular treatment of a target site in a patient's vasculature, the intravascular flow modifier and reinforcement device including a generally cylindrical frame formed of an elongate resilient wire configured as a series of helical windings, the system comprising:

a substantially tubular pusher catheter member having an inner lumen, a proximal portion, a distal portion, a tubular main shaft, and a notched portion having at least one notch formed in a side of the pusher catheter member for receiving at least one said helical winding; and

a release wire for removably retaining said at least one helical winding on said notched portion of said pusher catheter member, said release wire being threaded through the lumen of the pusher catheter member and over said at least one helical winding to retain said at least one helical winding on said notched portion of said pusher catheter member, said release wire being capable of being withdrawn from said notched portion of said pusher catheter member when the intravascular flow modifier and reinforcement device is positioned at the site in the patient's vasculature to be treated to release and deploy the intravascular flow

modifier and reinforcement device at the site in the patient's vasculature to be treated, said release wire being formed of a nickel-titanium alloy.